

# EVIDENCE TECHNOLOGY MAGAZINE

The magazine dedicated exclusively to the technology of evidence collection, processing, and preservation  
Volume 4, Number 5 • September-October 2006

## Funding for Laboratories



### FEATURED INTERVIEW:

**Roger Kahn, PhD**

Forensic Biology Director — Harris County (Texas) Medical Examiner's Office

# DNA laboratories are meeting the challenges of backlogs, training, and technology

An exclusive *Evidence Technology Magazine* interview with

## Roger Kahn, PhD

Forensic Biology Director  
Harris County (Texas) Medical Examiner's Office

**EVIDENCE TECHNOLOGY:** *There has been a lot of talk in recent years about the large number of DNA samples that are sitting—unprocessed and untested—in crime laboratories across the U.S. We have invited you to comment on this situation. What is law enforcement doing to reduce this backlog of DNA? What caused it in the first place? Why can't DNA be processed as promptly as other types of evidence?*

**KAHN:** If we were able to test DNA like other evidence is tested, it would be wonderful. Of course, backlogs affect all types of testing in almost all crime labs. If backlogs are not taken into account, most evidence in a crime lab can move quickly. In a controlled-substances laboratory, for example, you can identify cocaine within just hours of beginning to work on it. But DNA is not like that. Even under optimum conditions, it takes several days to a month or more to process and test it. On television, you don't see any of that. What you see on TV is a person going behind a door and coming out soon with the answer. But in a real DNA lab, they will go behind that door many, many times. It is far too tedious and boring to represent it in real time on television.

**EVIDENCE TECHNOLOGY:** *Tell us how it works in the real world.*

**KAHN:** DNA testing is still a craft. It is not automated. It involves a lot of



Roger Kahn

steps with a lot of handwork. As a matter of fact, the technology is just now coming to the point where we can turn over some of those steps to automated equipment. But most labs don't have that equipment, yet. As a result, people spend literally hours leaning over small test tubes, mixing liquids, labeling labels, writing notes. It's very similar to the way it was done in the beginning, years ago. The methods have changed, but the requirement for concentration and hands-on work has not changed.

**EVIDENCE TECHNOLOGY:** *There is a federal program for funding called "The President's DNA Initiative"...*

**KAHN:** Yes. And the funding from that initiative is moving automation along. Automation is very expensive and many laboratories would not be able to get automated equipment if it were not for these funds. So the funding program you refer to is having two effects. It is reducing the backlogs and the turnaround times. But it is also moving or catapulting these labs into the future by providing them with the ability to buy state-of-the-art tools. There's another benefit, too: The funding provides a ready market for these advanced tools—and because of that, manufacturers are beginning to pay attention to our fairly limited market. Manufacturers are beginning to develop products specifically for this market.

**EVIDENCE TECHNOLOGY:** *So they are beginning to supply hardware and software for DNA labs?*

**KAHN:** We are reaching the point where we will have our choice of robots. And soon, we will have our choice of software to help us with the interpretation of the complex results.

**EVIDENCE TECHNOLOGY:** *Testing and interpretation are not the same?*

**KAHN:** In addition to getting the data out of a DNA sample, we spend large amounts of time interpreting it. A great deal of that interpretation could be automated with the right software. At this time, there is no generalized soft-

## A brief look at the background and experience of Dr. Roger Kahn

Roger Kahn was named Forensic Biology Director of the Harris County (Texas) Medical Examiner's Office in October 2005. He holds a BS degree in biology from the University of California at Santa Barbara and a PhD in human genetics from Yale University. Dr. Kahn began his career in forensic DNA in 1988 with the crime laboratory of the Miami-Dade Police Department in Miami, Florida where he helped establish one of the first forensic DNA labs in the nation. He was a founding member of the FBI Technical Working Group on DNA Analysis Methods (TWGDAM), which established guidelines for quality assurance in forensic DNA laboratories. He joined the Ohio Bureau of

Criminal Identification and Investigation in 1996 as the DNA Laboratory Director tasked with establishing forensic DNA testing in the three crime labs operated by the state of Ohio. He was named Deputy Superintendent of Laboratories and supervised more than 80 scientists and support personnel in all forensic disciplines in Ohio's crime-laboratory system. Dr. Kahn is the author of numerous articles on the use of DNA in the crime lab. He has served on a variety of forensic policy and standards boards and on the editorial board of the *Journal of Forensic Science*. He is the immediate past president of the American Society of Crime Laboratory Directors.

ware for the interpretation of complex mixtures. There is software for the interpretation of simple samples like offender samples. It is not in general use, although it is becoming available. But the really difficult samples—the mixtures you frequently encounter in almost all sexual assaults, for example—has to be done by an expert who interprets the profiles.

**EVIDENCE TECHNOLOGY:** *What about that funding you mentioned earlier?*

**KAHN:** There is an on-going program of funding that is intended specifically for reducing DNA backlogs in crime laboratories. It is a program that is providing hundreds of millions of dollars for crime laboratories and to law enforcement. You can read all about it on the Internet at [www.dna.gov](http://www.dna.gov). This website is formally known as the *President's DNA Initiative*. It provides funding, training, and assistance to assure that forensic DNA reaches its full potential to solve crimes, protect the innocent, and identify missing persons. It's a multifaceted program that provides federal funds directly to DNA crime labs, as well as certain institutions and universities that assist the community in providing services to DNA. It's a five-year, one-billion-dollar federal-funding initiative.

**EVIDENCE TECHNOLOGY:** *How does it work? How do agencies get the funds?*

**KAHN:** Grants to DNA labs are given on the basis of a formula. You don't compete for them. You simply make the application and keep proper records ...and you get the money. The grants are based on two things: crime-rate and population.

**EVIDENCE TECHNOLOGY:** *How does it work in actual practice?*

**KAHN:** The primary funding for public crime laboratories is in the form of two different types of grants: DNA backlog reduction funds and DNA capacity-enhancing funds.

**EVIDENCE TECHNOLOGY:** *Can you go over them one at a time?*

**KAHN:** Sure. The backlog reduction funds provide money to remove DNA casework from a public laboratory's backlog and send it to private DNA

**“As laboratories catch up and expand, they will begin using methods that are increasingly sensitive. Samples that would not succeed today will be successful in the future.”**

—Dr. Roger Kahn

testing laboratories. There is a series of controls in place with regard to what private labs are eligible. The only burden beyond the recordkeeping is that the public labs have to review the cases themselves, which is not an insubstantial burden. A lot of effort is involved in reviewing the work, even when the testing has been completed elsewhere. The work involves putting the results into the national DNA database: CODIS (Combined DNA Index System).

**EVIDENCE TECHNOLOGY:** *And how about the other one?*

**KAHN:** The capacity-enhancing grants can be used for a number of things: to buy equipment, to renovate space, and to provide training. The equipment can be used to increase the throughput capacity. For example: If you have one genetic analyzer, you can buy a second. Or you can use it to automate your operations. You can get more sophisticated equipment or liquid-handling robotics or other types of automation. I think all of the labs are in the process of using the funds for that sort of thing. They are all upgrading. There is a considerable flow of money to these laboratories—hundreds of thousands of dollars per laboratory in most cases, depending on the size of the laboratories and the communities they serve.

**EVIDENCE TECHNOLOGY:** *And what kind of results are we seeing?*

**KAHN:** Well, one real benefit of these funds is to eliminate backlogs of cases that some people don't consider to be

genuine backlogs. To them, those cases are simply untested samples. Without the funds from the President's DNA Initiative, those cases would probably never be tested because, for example, the local agency might not be pursuing the investigation. That is perhaps the best example of the value of this funding. But a more perfunctory example has to do with just catching up. If you were to check with DNA labs across the country, you would undoubtedly find that unacceptably long backlogs are common. If an investigator simply submits a case and doesn't label it a rush, many months could pass before the DNA laboratory would be ready with results. The only way around the testing backlog is for the lab and the investigator to pursue it aggressively and make it a rush.

**EVIDENCE TECHNOLOGY:** *How much of the sampling can a lab process? And how much is outsourced?*

**KAHN:** That's a complicated question. I'm going to refer you to a report from the U.S. Department of Justice called "The 2005 Census of Publicly Funded Forensic Crime Laboratories." (*Editor's Note: See "Document Reference" at the end of this article for the Internet address for this report.*) As far as outsourcing is concerned, it is strongly tied to federal funding. There have always been some labs that used outsourcing to reduce backlogs, but those were exceptional. The majority of labs do not have the resources to do that. You might use that kind of approach if you expected to resolve your backlog problems with a one-time effort. But if you cut your backlog and then have it build back up again, then you haven't really solved the problem. That is what has been compellingly attractive about these federal funds. Once backlogs are cleared, the labs should be able to keep up with what comes in—and the DNA capacity-enhancing grants should help them to do that. You wouldn't want to permanently outsource cases because it can become very awkward and difficult. If you have a permanent need for additional resources including scientists, it is probably less expensive—and more convenient—to invest the money and build up your in-house resources.

**EVIDENCE TECHNOLOGY:** *We've talked about funding for hardware and soft-*



ware. What about training? Won't we need more training?

**KAHN:** Yes. And education and training become more complex as the laboratory resources and procedures become more complex. But here is a major point: Universities are now educating people for these jobs. There are dozens of universities that I could name off the top of my head that have programs which are specific for forensic-DNA careers. You can get a list of universities accredited by the forensics community on the Internet at [www.aafs.org](http://www.aafs.org). The host of that site, the AAFS (American Academy of Forensic Sciences), coordinates the accreditation with a program called *FEPAC* (Forensic Science Education Programs Accreditation Commission).

**EVIDENCE TECHNOLOGY:** *That site has a good list of educational references.*

**KAHN:** There is one thing I want to say about education: The quality of the graduates today is startling—in a good way! It has gotten substantially better over the 20 years I've been doing this. But even within the last 10 years, the improvement has been remarkable. Job applicants who come to interviews already know what the job is. That was always a problem in the past because most college graduates had never worked in a crime lab—and some had never worked in a biology lab, except for a few hours in a course. But now, the graduates who come here seem to really understand what employment in a crime lab is like. They understand what will be expected of them and what the daily activities will be. They want these jobs. They expect a career in forensics. It is remarkable. Another thing: The availability of applicants with graduate degrees has dramatically increased, mainly because the forensic-science programs being offered today are almost all graduate programs. We have several PhDs working here now. But 20 years ago, it was almost unheard of to have a PhD in a crime lab. The bar has been raised dramatically.

**EVIDENCE TECHNOLOGY:** *Are there accepted standards for training?*

**KAHN:** For some of the jobs, yes. DNA analysts or examiners are the people who interpret and write the DNA

results. There are national standards for forensic DNA testing laboratories and DNA databasing laboratories. In fact, DNA is the only evidence category that has national standards, per se. Those standards require examiners and analysts to undergo a minimum of eight hours of relevant training per year. Unlike most other forensic-science endeavors where training is required—but the amount of training is not defined—DNA analysts have to have at least eight hours or they won't meet the standards. There are a number of opportunities available for this training, many of which can be paid for with the same funding we were discussing earlier. There is training you can bring to your location. There is training you can send people to. And there is on-line training. Much of this training is free. If it is not directly funded through grants to the laboratories where the individuals are employed, it is provided to one of these institutions or universities so they can make these courses available at no cost.

**EVIDENCE TECHNOLOGY:** *Where can someone get more information?*

**KAHN:** In that regard, among the many training resources, there is one group of institutions that I should mention. It is known as the Forensic Resource Network (FRN). Here's how this group is described by the National Institute of Justice (NIJ): "The Forensic Resource Network (is) a collaboration among NIJ grantees (that) provides innovative solutions to challenges facing the forensic science community. The FRN assists state and local crime laboratories with such issues as quality assurance, validation and evaluation, new technologies..." There are four member organizations in the FRN: (1) the National Forensic Science Technology Center (NFSTC) in Largo, Florida; (2) the National Center for Forensic Science (NCFS) in Orlando, Florida; (3) the Marshall University Forensic Science Center (MUFSC) in Huntington, West Virginia; and (4) the West Virginia University Forensic and Investigative Science (FIS) program. Those four institutes and universities make up the FRN. They have federal funds that are specifically utilized to assist state and local crime labs.

**EVIDENCE TECHNOLOGY:** *What kinds of positions are there in a DNA lab?*

**KAHN:** All laboratories are required to have a DNA Technical Leader. That person will have very specialized training and experience requirements. Reporting to that person, there are usually three categories of position titles that are defined by the standards. The roles they play differ and they each have different requirements with regard to educational backgrounds.

**EVIDENCE TECHNOLOGY:** *Let's take them one at a time.*

**KAHN:** In addition to the Technical Leader, there is the Examiner/Analyst, a person who needs a minimum of a bachelor's degree or the equivalent in biology, chemistry, or a forensic-science related area. That person must also have specific course work in areas that are related to DNA testing.

**EVIDENCE TECHNOLOGY:** *Next...*

**KAHN:** There is the Technician. This person will receive on-the-job training that is specific to the function. He or she will have to pass a test before being allowed to participate in DNA-typing responsibilities. But there are no educational requirements for that position. The Technician does not interpret or report, but simply does certain technical work within the laboratory

**EVIDENCE TECHNOLOGY:** *And last...*

**KAHN:** And then there are the positions of Laboratory Support Personnel. These individuals do not participate in the testing of evidence samples. They can maintain the laboratory, clean up, wash dishes, order things, label things, and do certain routine checks, such as temperatures. It is a position requiring lower credentials but with lower responsibility.

**EVIDENCE TECHNOLOGY:** *But that person frees the Technician and the Examiner/Analyst from time-consuming day-to-day chores so they can focus on more important chores.*

**KAHN:** Right. Bear in mind that the job descriptions are from papers entitled "Standards for Forensic DNA Testing Laboratories" and "Standards for Convicted Offender DNA Databasing Laboratories." (Note: See the

# INTERVIEW

*“Document Reference” at the end of this article for the Internet addresses of these papers.)* As far as I know, this is the only crime-laboratory discipline that has national standards like this. Some people might disagree, saying that ASCLD/LAB (American Society of Crime Laboratory Directors, Laboratory Accreditation Board) and FQS (Forensic Quality Services) accreditation requirements are national standards. But those are different because they are standards that were created by an agency that is auditing your laboratory for accreditation. The standards I am referring to are required because they are part of federal law. The FBI was required to issue these standards and is in the regulatory role. The FBI doesn’t review the audits of the rest of the disciplines, but they have to review the audits of DNA labs. Why? Because of CODIS. In order to ensure the data quality in CODIS, the FBI has to see whether the labs that are putting data into the CODIS system are following the standards—and nearly all public-sector DNA laboratories put data into CODIS.

**EVIDENCE TECHNOLOGY:** *Are there any specific training standards required for crime-scene personnel who collect DNA evidence?*

**KAHN:** There are voluntary accreditation standards only. In most instances, crime-scene investigators know how to collect DNA evidence very well. That is not to say that collecting DNA is a simple task. But most of them already know how to collect biological evidence. Collecting DNA evidence is no different than collecting the serological evidence they’ve been collecting for years. From the samples we receive, it is clear that they understand the proper way to collect samples and to prevent contamination.

**EVIDENCE TECHNOLOGY:** *Should there be standards in this field?*

**KAHN:** Personally, I believe there is

always an agency somewhere that could use standards in order to achieve what it needs. So I support standards for all of the crime-laboratory and crime-scene endeavors.

**EVIDENCE TECHNOLOGY:** *What about the future? Where are things going to go in the next few years?*

**KAHN:** DNA can do a great deal more than what it has been doing. Samples that don’t yield enough DNA for routine testing can still yield informative results. We can go deeper. We already have methods to do that. As laboratories catch up and expand, they’ll begin using methods that are increasingly sensitive. Samples that would not succeed today will be successful in the future. The technology will improve. And what we are doing will become increasingly automated and easier to do. There will be more tests completed per dollar spent in the lab—that’s for sure. In addition, there are other types of tests that can be helpful—and we will use them more frequently.

**EVIDENCE TECHNOLOGY:** *Can you give us an example?*

**KAHN:** Sure. Testing DNA from pets is one example. Let’s say that an individual burglarizes a home and he is very careful and doesn’t leave his DNA in the home. But he does happen to pick up some dog hair from the family pet on his clothing. Well, that can be matched to the victim’s pet through DNA. That sort of thing can be done. It is not done routinely today, but it will be in the future.

**EVIDENCE TECHNOLOGY:** *What else?*

**KAHN:** Well, we can link plant residue (parts or pieces) to individual plants. I’m not sure we will get to the point where we can match grass stains with grass at the crime scene. But I’ve seen reports of clonal source for marijuana, for example. A small amount of mari-

juana can be determined to be part of a larger amount—and that can help identify the individual who is selling the larger amount, along with his sales network. That’s one example. There have also been cases where the DNA of seeds found in a suspect’s vehicle have been linked to a tree at a crime scene. That sort of thing will become increasingly more prevalent in the future. There are a number of possibilities right now. You can identify the racial origin of a DNA sample. That might not be frequently needed information, but it could be important. There are also some physical characteristics that are becoming available from DNA. Eye color, for example. And in certain cases, hair color.

**EVIDENCE TECHNOLOGY:** *Is there anything else coming in the future?*

**KAHN:** Well, there are tests in development that will determine the age of the individual who left the sample. For example: If you find a bloodstain, you will be able to find out if this is a young person or an old person. There will also be tests for the age of the sample. In other words, is it a fresh bloodstain or an old bloodstain? There is also the potential to determine the post-mortem interval—where you can determine how long the individual has been dead by using DNA to determine the species of the maggots on the body—and that can be used to determine the post-mortem interval. All of these things will have value for law enforcement.

**EVIDENCE TECHNOLOGY:** *Incredible.*

**KAHN:** It’s a fascinating field. And it is a growing field. The elimination of backlogs is going to free up most of our resources so we can expand the number of services we provide.

**EVIDENCE TECHNOLOGY:** *Thank you for speaking with us today. ○○○*

## DOCUMENT REFERENCE

“The 2005 Census of Publicly Funded Forensic Crime Laboratories”  
[www.ojp.usdoj.gov/bjs/pub/html/cpffcl05sol.htm](http://www.ojp.usdoj.gov/bjs/pub/html/cpffcl05sol.htm)

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[www.fbi.gov/hq/lab/codis/offender.htm](http://www.fbi.gov/hq/lab/codis/offender.htm)